



A seamless flash-flood early warning tool based on IDF-curves and coupling of weather-radar with numerical weather predictions

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A flash-flood is a flood that develops rapidly after a heavy precipitation event. Flash-flood forecasting is an important field of research because flash floods cause a lot of fatalities and damage. A flash-flood early warning tool is developed based on precipitation statistics. Our target areas are small ungauged areas of southern-Switzerland. A total of 759 sub-catchments was considered. In a first intensity-duration-frequency (IDF) curves for each catchment have been calculated based on: A) Gridded precipitation products for the period 1961 to 2012 and B) gridded reforecast of the COSMO-LEPS NWP for the period 1971-2000.

These different IDF-curves at the catchment level in combination with precipitation forecasts are the basis for the flash-flood early warning tool. The forecast models used are COSMO-2 (deterministic, updated every three hours and with a lead time of 24 hours) and COSMO-LEPS (probabilistic, 16 member and with a lead time of five days).

In operational mode COSMO-2 is nudged to real-time data of a weather-radar precipitation obtained by blending the radar qpe with information from a national network of precipitation data. This product is called COMBIPRECIP.

The flash-flood early warning tool has been evaluated against observed events. These events are either discharge peaks in gauged sub-areas or reports of damages caused by flash-flood events. The hypothesis that it is possible to detect hydrological events with the flash-flood early warning tool can be partly confirmed. The highest skill is obtained if the return-period of weather radar QPE is assessed at hourly time scale. With this it was possible to confirm most of the damage events occurred in 2010 and 2011. The prototype tool is affected by several false alarms. This is because initial conditions of the soils are not considered. Further steps will be therefore focussed on the addition of real-time hydrological information as obtained from the application of high resolution distributed models.